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Body Mechanics Program for a Material Handling Environment

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Body Mechanics Program for a Material Handling Environment

by

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A Scholarly Project

Submitted to the Occupational Therapy Department

of the

University of North Dakota

In partial fulfillment of the requirements

for the degree of


Master's of Occupational Therapy

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Approval Page

This Scholarly Project Paper, submitted by Jeremy Laine in partial fulfillment of the requirement for the Degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.


Faculty Advisor

5-15-06
Date

PERMISSION

Title Body Mechanics Program for a Material Handling Environment
Department Occupational Therapy
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ABSTRACT

A series of improper body mechanics can lead to injury with in a manual material-handling environment (Hagan, 2001). Improper body mechanics are a result of poor work habits that negatively reinforce a worker. When a worker in a manual material handling environment conducts his or her essential job functions, while ambulating to do their job, certain behaviors negatively reward a worker such as completing their tasks faster or what is perceived as more efficient. These behaviors specifically include, but are not limited to: increasing job pace or reckless speed, twisting repetitively, bending at the pelvis, back extension, forceful action, one arm retrieval/placement of product and misuse of equipment. When these negative behaviors or micro traumas compound over a period of time they may result in soft tissue injury such as; low back pain, shoulder strain, knee/ankle sprains, groin strain, chest/abdominal wall strain and others.

The methodology used included a review of the literature to; 1) identify best practices regarding body mechanic training and education programs, 2) identify presentation/teaching strategies and methods to increase the opportunity for success and 3) identify effective methods to monitor the success of body mechanics training and education. The literature review resulted in the development of a Body Mechanics Program designed for a Manual Material-handling Environment. Training modules include proper education of anatomy, hazards, proper spine alignment, positive reinforcement and demonstration of correct work postures. This program is designed to be implemented from the perspective of occupational therapists.

CHAPTER I

INTRODUCTION

Today, many organizations are challenged with finding cost cutting measures for a profitable and effective business model. Several steps are taken by businesses to achieve low expense ratios to their bottom line. One expense to the bottom line that can have a great impact on profitability is the expense of worker's compensation. Often times, businesses implement different types of safety programs to minimize the costs associated with work related injuries. In particular, industries that require manual material handling, which is the act of moving products, can have large expenses associated with worker's compensation due to the physical nature of the business.

In manual material-handling environments, the Occupational Safety and Health Administration or OSHA has identified specific injuries related to these large expenses. These injuries are called MSDs or musculoskeletal disorders, and often times referred to as soft tissue injuries or even cumulative trauma disorders. MSDs are injuries that involve the muscles, tendons, ligaments, and skeletal systems of the human body, such as muscle sprains and strains; injuries to muscles, ligaments, and discs in the back; injuries to nerves, ligaments and tendons in the hands, wrists, arms, shoulder, neck, or leg; and abdominal hernias and long-term pain (OSHA, 2005). MSDs make up one third of all work related injuries, and over half of the costs (OSHA, 2003). One profession leading the way in prevention of MSD injuries are Occupational Therapists who are trained in the

treatment, causation, and prevention of these MSDs. Through the use of a body mechanics from an occupational or work perspective this project plan will show how a comprehensive body mechanics program plan can help prevent these injuries in the workplace.

Occupational Therapy roles in their profession can be very diverse. Therapists can specialize and/or work in many different areas such as pediatrics, geriatrics, general physical rehabilitation, psychiatry, outpatient care, inpatient care, qualified rehabilitation consultants, ergonomic experts, consultants, educators, government positions, and much more.

One of the main premises of Occupational Therapy is that humans are occupational beings, and people derive their purpose through work. Core to the profession of Occupational Therapy is the concept of human occupation and its use of rehabilitation and/or prevention. Occupation is composed of the daily tasks and purposeful activities we engage, coupled with the meaning or personal subjective value these tasks and activities provide (Kramer, 2003).

Two areas of Occupational Therapy that relate directly to the work environment are ergonomics and correct work postures. First, ergonomics, sometimes referred to as human factors engineering, comes from the Latin terms *ergos* and *nomos* which mean work and law (Hertfelder, 1989). Many times ergonomics is broadly interpreted to include aspects of correct work postures or body mechanics. Strictly interpreted, ergonomics is the applied science of equipment design, for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort (Dictionary.com,

2003). Second, correct work postures or body mechanics is defined as the application of kinesiology for the use of proper body movement in daily activities, for the prevention and correction of problems associated with posture, and for the enhancement of coordination and endurance (Dictionary.com, 2003).

Since Occupational therapists are educated in human anatomy, task analysis, occupational theory, industrial psychology, physical rehabilitation, activities of daily living, anthropometrics, manual muscle movement and testing, ergonomics, physical evaluation and treatment, and body mechanics they can help address many work related injuries and illness, and specifically MSDs. Occupational Therapists are often considered experts in education and prevention, so applying body mechanics in the workplace for injury prevention is a definitive aspect of the profession.

There are many different theories of Occupational Therapy, the biomechanical model and the community learning PRECEDE-PROCEED model are the two approaches that directly apply to the manual material handling work environment and prevention of MSDs. The biomechanical model is a strict model that believes in correction of human dysfunction through mechanical means such as exercise. The PRECEDE-PROCEED model is a health education model used for adult learning with a range of community considerations. Together, they create the framework for useful information on function and education for body mechanics in a manual material handling environment to prevent injuries. In addition, a performance management behavioral approach to deliver of proper feedback on the body mechanics is also used as part of the teaching module.

The next chapters will provide information on an Occupational Therapy approach

to body mechanics in a manual material handling environment by demonstrating the following; valid literature review to this topic, methodology to creating teaching module, explanation and teaching module, and a conclusion with recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

There is an enormous amount of information on workplace injuries and their effects. A Wall Street Journal article titled, “on the rise in employers’ costs for worker’s compensation in the United States as of July 2005” (Wall Street Journal, 2005, p A2), discusses the large increases in worker’s compensation expenses. According to the California edition of the Kiplinger Letter, a financial business forecasting publication, worker’s compensation had been rising since the year 2000 and they expect costs to rise by double digits in the next several years (Kiplinger, 2003). In fact, Kiplinger’s survey in 2003 stated that 36% of businesses report compensation costs are slowing their growth, 45% are reducing hiring, and 52% are increasing safety awareness and programs (Kiplinger, 2003, p1). Recently, the 2006 insurance premiums released have seen double digit increases according to Kiplinger. However, OSHA has reported a growing trend of a reduction in overall recordable injuries in the workplace. For example, in 2004 there were 108,000 less recordable cases than in 2003. Even though there is an overall reduction in the total amount of injuries experienced at work, there is an explanation for increasing costs. In 1999, Charles Jeffress, past assistant secretary of labor within the Occupational Safety and Health Administration(OSHA) reported that each year 1.8

million workers have musculoskeletal disorders (MSDs) related to ergonomic factors and 600,000 employees miss work because of MSDs. MSDs are injuries that involve the muscles, tendons, ligaments, and skeletal systems of the human body.

The issue regarding the MSD injuries and related costs is evident in numerous organizations nationally. One example is the Washington State's Worker's Compensation Fund where the burdens of work-related musculoskeletal disorders (WRMSDs) were enormous. For the period of 1992-2000, Washington State accepted 380,485 workers' compensation state fund claims for non-traumatic soft tissue musculoskeletal disorders of the neck, back, and upper extremity (WSDLI, 2005). These claims resulted in \$2.9 billion in direct costs, and 26.9% of all state fund workers' compensation claims. Of the total WRMSD claims accepted during this time period, 32.4% were compensable with an average of 123 lost time days per compensable claim. Washington State, like many other states, has dealt with increases in worker's compensation costs associated with MSDs. Many of these MSDs are due to improper and/or repetitive motions experienced in the work place. In particular, this scholarly project looked at the manual material handling workplace and how a body mechanics program can be a preventative tool to reducing MSDs.

Manual Material Handling

Material handling is defined as the act of loading, unloading, and moving product (Dictionary.com, 2003). It is critical part of a vast network, supply chain of goods, created for the sale of goods where companies manufacture, distribute, handle, store,

transport, and retail a specific product. This understanding encompasses almost every major commodity business, which provides the convenience of purchasing product such as: a board at a home improvement store, jeans at a clothing store, package delivery, steel parts, groceries and much more. As defined by Supply Chain Today, supply chain is getting the right product, to the right place, in the right quantity, with the right quality, at the right cost (supplychaintoday.com, 2005).

Manual material handling is required for the sale of product at all levels of the supply chain. Such as a can of soup manufactured in the factory, packaged for transport, shipped in a semi-truck, stored in a warehouse, selected by a worker, shipped to a store, to be stocked on the shelf for purchase, all the while a worker in each area is material handling this product. This process requires a worker to retrieve and place that product to transport for business needs at each level of the supply chain. Several other examples include: loading luggage into a cargo bay of an airliner or a worker placing a car part onto a pallet.

The United States has transformed its transportation methods in the last several decades, and the dependence on the manual material handling and trucking industry has grown steadily for several years. Every time you see a semi-truck or cargo plane, think about the fact that someone had to load it, either by a single product case or by pallet on a forklift. Regardless of the situation or location, a manual material handling worker needs to move that product or cargo for sale of goods. Even with technological advancement, only 33% of manual material handling is completed by mechanization in comparison to 20 years ago (Rosenberg, 1993). Because of the intensive manual labor

involved with this type of work, many MSDs and high worker's compensation costs have been reported by industries involved with manual material handling. The Occupational Safety and Health Administration or OSHA has targeted these types of industries in order to reduce the number of MSDs each year to create safe and healthy work places.

Role of OSHA

According to the United States Department of Labor, MSDs accounted for one third of all injuries in 2002. Of the MSDs reported that year, 80% of them were injuries as a result of manual material handling types of workplaces (USDOL, 2005). There are many different types of manual material handling hazards that contribute to the development of MSDs. Musculoskeletal disorders of any cause are among the most prevalent medical problems, affecting 7% of the population and accounting for 14% of physician visits and 19% of hospital stays (CDC, 1997). When looking specifically at work-related musculoskeletal disorders, the Bureau of Labor Statistics (BLS) reports that in 1995, 62% (308,000) of all illness cases were due to disorders associated with repeated trauma.

Because of the affects of MSDs and injuries in the work place, OSHA developed a five year strategic plan to reduce injuries. OSHA's (n.d.) 2003-2008 Strategic Management Plan Goals are as follows:

Faced with both new challenges and persistent safety and health issues, the Occupational Safety and Health Administration (OSHA) developed a 5-year Strategic Management Plan that directs the agency's resources towards three over-reaching goals, one of which focuses on the reduction of occupational injuries, illness, and fatalities. By 2008, OSHA's goal is to reduce the rates of workplace fatalities by at least 15 percent and workplace injuries and illnesses by at least 20 percent (OSHA, n.d.).

To begin the process, OSHA developed several criteria to identify the industries that were at high risk. These criteria are as follows:

1. Industries with at least 5,000 total injury and illness cases in Calendar Year (CY) 2000;
2. Industries with a lost workday injury/illness rate (LWDII) of 3.0 or greater in CY 2000;
3. Industries not in construction;
4. Industries with no more than 30% of injuries and illnesses involving days away from work caused by ergonomic events; and
5. Industries with at least 50% of injuries and illnesses involving days away from work as severe as to result in at least six days away from work. (USDOL, OSHA, 2006).

Once the criteria was established, OSHA made an effort to develop a list of industries with high injury/illness rates and a high proportion of severe injuries/illnesses. OSHA placed emphasis on those high incident/high severity industries, which fit into the demographic of injury concerns dealing with manual material handling and MSDs. Based on these criteria, seven industries were selected to target for direct interventions, with inclusion in the strategic surveillance program, and for use as performance measures. The selection purpose was to focus targeting of outreach and enforcement activity with these industries. The industries that met the criteria are:

Table I: Targeted Industries (USDOL, OSHA, 2006)

Industry	MSDs
Landscape and Horticultural	40%
Oil and Gas Well Drilling	34%
Preserved Fruits and Vegetables	35%
Primary Metals and Basic Steel Products	37%
Ship and Boat Building and Repair	40%
Public Warehousing and Storage	41%
Concrete and Concrete Products	41%

All of these industries have some form of manual material handling hazards or risk factors, such as heavy lifting in the steel products or repetitive motion in warehousing. OSHA does target many of these industries for non-MSD related preventable incidents such as crushing accidents or chemical exposures, but nearly half of the injuries experienced involved MSDs.

OSHA has published several guidelines for manual material handling environments to prevent MSDs in the workplace. In fact, they have published a full prevention guide for manual material handling in grocery warehousing, one of the seven targeted industries (OSHA, 2005). The document covers several areas in warehousing such as; transport, techniques, storage, packaging, and work practice. Each of these areas discusses the specific procedures and demands for prevention with special consideration for grocery warehousing. Two areas of specific interest are the techniques and work practice sections. First, the techniques section explains the hazards of workers bending at the waist and not bending their knees. Also, heavier items are typically placed on the bottom of the pallet for stabilization, which requires a worker to bend down to a pallet versus staying at waist level. To alleviate some of these hazards, the worker should consider the following; raise the forks of the pallet jack to allow the workers to keep product close to the body, provide height-adjustable picking equipment for optimal height usage, use proper lifting techniques to avoid twisting, stack extra empty pallets to increase height, and use a palletizer to keep product at waist height. Last, the section on work practice explains the hazards of not following logical preferred methods while depalletizing. The publication suggests that a layer by layer work method should be used

when reaching to the back for a case, so he or she is able to slide it forward prior to lifting. Another solution is to use a pyramiding technique where a worker is able to access all sides of the product on a pallet, thus being closer to the product by limiting the forward reaching and pulling. This publication has clear direction on body mechanics with in a manual material handling environment. Analyzing the job to determine these proper techniques of body mechanics can be accomplished via a job analysis and hazard analysis conducted by an Occupational Therapy services.

Not every manual material handling environment has been targeted by OSHA. In November 2002 the airlines industry partnered with OSHA to address a long standing problem of baggage handlers with high MSD injury rates. Two thirds of the 559,000 employees in the air transportation industry worked on the ground helping move people, baggage, and cargo (Greene, 2005). This allied effort addressed ergonomic issues for manual workers with programs of addressing hazards and using correct work postures while lifting, and as a result they have experienced higher moral and lower injury rates.

The United States Department of Labor reports that over one million workers suffer back injuries every year (USDOL, 2005). Within a manual material-handling environment, back injuries make up the largest portion of all the MSDs in frequency and cost. One forth of all worker's compensation costs are due to back injuries, which cost billions of dollars to companies as well as the suffering endured by workers (OSHA, 2005). While specifically conducting manual material handling, four out of five injuries were to the low back, and three out of four were during lifting (OSHA, 2005). Studies discussed in OSHA's Health Effects section indicate that employees performing manual

handling tasks have a significantly higher risk of back injury where they are exposed to force, repetition and/or awkward postures on the job, as discussed in ergonomic proposal by OSHA (OSHA, 2000).

Back Injury

Back injuries are one of the most common reasons for hospitalization in the United States today. They include injuries to the spine, back muscles, discs, nerves, joints, etc. Typical diagnoses include: back strain, bulging disc, disc herniation, sciatica, stenosis, degenerative disc disease, and much more. All of these injuries include a mechanical interruption of the function of the back and can be classified as MSDs. These back injuries are no different than the MSDs discussed earlier since they involve the muscles, ligament, tendons, bones, and nerves. The human spine is composed of vertebrae in the cervical, thoracic, and lumbar regions of the spine with discs between each vertebra. These discs and vertebrae take on large amounts of pressure during movement, which make them prone to injury. Since the back is the center of gravity, all other limbs move from its centralized stable point, and it is meant to be a prime stabilizer not a mobilizer.

Hazards

OSHA has many resources available for employers on hazards associated with causation and controls of back injuries. They have published a technical manual via their etool website that discusses this topic in detail. The manual points out that back injuries are found to develop as a result of microtraumas brought about by repetitive activity over time or from a single traumatic event (OSHA etool, 2005). Specifically, there are

hazards that are the root causes of MSDs and back injuries, and they typically involve improper environmental controls and poor lifting methods (OSHA etool, 2005). This improper lifting or mechanics includes excessive back motion such as twisting, lifting at the waist, over reaching, grabbing with one hand, imbalanced carrying, awkward bending, environmental conditions, poor posture, static positioning, heavy handling, extended pulling, and pushing. A series of improper body mechanics can lead to injury with in a manual material-handling environment (Safety and Health, 2003).

According to an analysis on baggage handling done by OSHA, the major hazard contributing to back injuries is twisting at the torso (OSHA, n.d.). There is growing evidence the domain of physical and mental work demands, as characterized through work elements, can interact to precipitate hazardous conditions which potentially result in MSDs to include back injuries (Shoaf, 2000). These work demands include: weight, frequency, distance, height, duration, twisting angles, complexity, and number of occurrences for mental demands. Keeping the spine aligned properly and preserving the curvature of the spine are the basics of proper body mechanics.

Many research studies have been conducted to determine the causes of back injuries. In 1997, National Institute for Occupational Safety and Health (NIOSH) explored causation of back injuries to address the concerns of heavy and repetitive lifting. NIOSH conducted a study on workers who lifted 100 pound sacks of potatoes versus those who lifted 50 pound sacks of potatoes (NIOSH, 1997). They found a higher incident and severity rate of back injuries with workers who lifted the 100 lbs sacks. Their recommendation through this process of studying these two jobs are: decrease the

weight of product lifted; create safe lifting zones to ensure ergonomic controls; and learn how to properly lift materials or have proper body mechanics(NIOSH, 1997). It is important to note that the nature of these hazards that attribute to back injury causation do not always determine the impacts that follow a back injury, which can be devastating with even the smallest of amount of hazard exposure.

Impacts of Back injuries

Back injuries can have several types of impacts to a number of different people and organizations. This section will present the impacts in detail in order to validate the reason for a body mechanics program. The obvious impacts are to the employee who sustains a work related injury with pain and suffering as well as potential wage impacts of receiving out of work benefits which are commonly less than a regular income. In addition, employers or organizations are impacted by the loss of a valuable employee if they are unable to work, not to mention the insurance and medical costs associated with the injury. Even society as a whole is affected by the large amount of individuals who miss work and are affected by back injuries. This section will present in more detail the impacts of back injuries from an employee, organization, and society standpoint.

Employee: Obviously, the employee is the most impacted by the back injury they have sustained. There can be impacts to employees physically, psychological, socially, financially, and with in their own family. Imagine working in a manual material handling environment and sustaining a function limiting back injury. It would be no different than the mathematician having a brain injury and not being able to teach algebra. Human

function, particularly a healthy back, is an absolute requirement for the manual material handling worker, because without it they are unable to perform work. In addition, many psychosocial factors plague a worker who is injured, such as loss of worker role, poor worker identity, decreased self-concept, and more (Rice and Luster, 2005). These types of problems incite fear, anger, anxiety, embarrassment, guilt, and suspicion in all the affected persons. This is especially difficult with MSDs since the causation and prognosis is more subjective than other injuries like a cut finger that requires stitches. Financially, many injured worker's have a big impact to their pocket book. For example, the Minnesota Department of Labor, Worker's Compensation Statutes, only require employers to pay 66% of the employees average weekly wage based on the prior 26 weeks before the date of injury (MNDOLI, 2006). With workers who have large families, this is even more of an impact since their pre-injury income is a higher wage with tax breaks. Regardless, having a work related injury is a huge impact to an employee and the people around them whether it is a family member, co-worker, or the employer.

Organization: Second, the employee's organization is also affected by the injuries. In 2000, United States companies paid more than 23 billion in medical costs alone (Wolf, 2005). In regards to the impact of back injuries affecting companies, OSHA has reported the following statistics:

Work-related musculoskeletal disorders (MSDs) currently account for one-third of all occupational injuries and illnesses reported to the Bureau of Labor Statistics (BLS) by employers every year. These disorders thus constitute the largest job-related injury and illness problem in the United States today. In 1997, employers reported a total of 626,000 lost workday MSDs to the BLS, and these disorders accounted for \$1 of every \$3 spent for workers' compensation in that year. Employers pay more than \$15-\$20 billion in workers' compensation costs for these disorders every year, and other expenses associated with MSDs may increase this total to \$45-\$54 billion a year (OSHA, 1997).

Low back injuries account for a large percentage of all workers' compensation cases, according to OSHA. (OSHA, 1997). These costs and lost work days have great impacts on employers and organizations. The 626,000 lost work days equates to about 2,500 workers out of work for the whole year nation wide. That means employees are unable to provide their employer with the valuable resource they were originally hired for. This requires other employees in that organization to make up for the lost work. In addition, organizations paid massive expenses of \$15-\$20 billion in lost work benefits and health care costs as reported by OSHA due to these injuries. Worker compensation costs are on the rise and employers are looking for sensible cost effective safety programs, such as body mechanics, for the future to achieve business effectiveness.

Society: The costs and impacts with workers who are injured affect more than just the employee and employer. Advance for Occupational Therapy Practitioners (Wolf, 2005), claims that more money is spent on medical care for injured workers than regular patients and many of the involved costs are unfairly displaced onto co-workers, family members, and other businesses. In addition, businesses pass on the worker's compensation cost onto the consumer through the cost of goods or inferior products. Because of these high costs, industries are constantly looking for more affordable means

of completing manual tasks, such as mechanization. As mentioned earlier, there is 33% less manual jobs than 20 years ago, due to mechanization (Rosenburg, 1993). With these considerations in mind, society has placed a bigger role on injury prevention than ever before, which helps justify the need for a program like body mechanics with in a manual material handling environment.

Prevention

Preventing back injuries is one of industry's biggest safety challenges, according to OSHA's publication on the nation's number one workplace safety problem fact sheet 2006 (OSHA, n.d.). Companies that have manual material handling aspects of their business are challenged with the impacts of MSDs and in particular back injury MSD causes and impacts. There are many types of injury prevention interventions for MSDs with in a manual material handling environment. Recently, there has been a change in the perception of the causes of back injuries. Emerging clinical research suggests that up to 65 percent of MSD risk can be attributable to individual employee risk factors, while as little as 35 percent can be attributable to the job or workstation (Greene, 2005). In addition, unsafe working conditions account for only 20% of all injuries in the workplace and 80% are due to unsafe acts (Injury Prevention and Cost Control Alert, 2005). Based on these statistics, employers are faced with a huge task of identifying hazards, training employees on correct methods, communicating risk factors, and monitoring for compliance. However, training employees to have a long-term lasting effect can be difficult and several considerations need to be taken into account when designing an effective training program.

Body Mechanics and Positive Reinforcement

There are many traditional safety training programs designed for reducing or alleviating MSDs. Typical MSD safety programs have focused in areas such as: wellness, stretching, strengthening, ergonomics, hazard identification, mechanization, and personal protective equipment. One fairly unique approach is body mechanics, which is using correct work postures and movements in daily work tasks to prevent injury. As defined by NIOSH, body mechanics is determining proper human movement through a complex relationship between weight, height, and posture regarding the spine (NISOH, 1995). The use of proper body mechanics within a manual material handling environment can reduce the number of MSDs (Gaspers, 2005). *Ergonomic Opportunities* (Fontana, 2002), “The Time is Now”, claims that proper lifting or body mechanics can reduce the amount of back compression while lifting which leads to injury. In addition, proper work methods, prescribed in wellness medical management, such as body mechanics and conditioning can reduce work related injuries (Gaspers, 2005). In order to know what are the correct work postures and movements, an analysis of the job needs to be conducted. An Occupational Therapist conducts a job site analysis where an in depth task review is completed to understand the environmental demands in order to determine the proper human movements for training employees.

With any prevention program, effective methods of training and communication are keys to the program success. The method of body mechanics communication, education, and training can be done in traditional ways, such as meetings, seminars, bulletins, etc. However, performance management contends that positive reinforcement

through observation is one of the most effective methods of applying safety practices (Daniels, 1989). The new era in safety has coined performance management as behavior-based safety. The research suggests that corrective style of reinforcement will only result in average level of safety performance, such as correcting an employee for lifting incorrectly. Positive reinforcement should be used if employee is able to learn and demonstrate the desired behavioral outcome of proper body mechanics above an average level of performance. Behavior-based safety has been identified as one of the most effective tools for safety compliance in the workplace (Daniels, 1989). Specifically, positive reinforcement has proven to increase moral, production, and the level of execution. A positively reinforced body mechanics approach focuses on behavior and methods together, which can be very effective. The goal is to properly provide the manual material handling worker education on the body mechanics for daily tasks and give feedback on their ability to perform the work appropriately to reduce the risks of back injuries and MSDs.

In order to attain a level of proper mechanics and positive reinforcement, an employer must conduct an analysis of the work environment, determine best practices, use appropriate training/educational methods, and measure successes. Traditionally, safety professionals, such as industrial hygienists, are faced with addressing hazards that cause MSDs. However, there is increasing support for Occupational Therapy services in industrial settings for injury prevention and management (Miller, 1998). This is due to the holistic approach that Occupational Therapy uses, which contains a medical, psychological, and occupational aspects of job safety. The role of OT in this area will be

discussed in more detail later.

Resistance to body mechanics and positive reinforcement

Proper Body Mechanics is fairly new type safety intervention. It was used as a specific injury prevention tool with OSHA's Ergonomic Standard that was proposed in 1999 under the Clinton Administration (OSHA, 2000). To much criticism, the Ergonomic proposal was repelled under the Bush Administration. Several businesses felt OSHA's Ergonomic Standard was unquantifiable regarding return on investments for capital expenditures spent for the ergonomic re-designed of workplace environments. For example, with in the warehousing environment, OSHA suggested recommendations from NIOSH on optimal lifting zones (NIOSH, 1997). These zones outlined safety lifting heights for retrieval and placement of product. This lifting zone would require a warehouse to redesign product storage, so that when a worker retrieved product, they would not have to bend below 32 inches and reach over 60 inches. In order to accomplish this, a warehouse would have to put half pallets with in there slots or develop a lifting mechanism to keep the optimal height for lifting, which would double the space requirements or have a large expense. Many businesses often recognize the advantages of this re-design, however the ergonomic standard has been delayed by opposition from business groups and some lawmakers who are concerned about the cost. Collectively, they have protested the standard by claiming there is not enough scientific evidence proving that ergonomic problems at work cause injury (CNN.com, 1999). In addition, many businesses contend that they do not have the capital to implement these expensive changes. For example, in a very small warehouse with 1,000 pallet positions, a self

adjusting height mechanism would cost over a million dollars and the company's workers compensation costs are far below this amount and a return on investment would take several years even if the data was correct.

Body mechanics however, is much more affordable piece of an ergonomic initiative. The cost is simply the time spent in wages for program development, education, training, communication, implementation, and follow-up just like many traditional safety programs. Body Mechanics delivered from an Occupational Therapy perspective is unique in that it helps the employee interact or adapt to the environment to minimize risk of injury by performing correct work postures and movements of the human body.

Role of Occupational Therapy

Occupational Therapists are medical professionals who work in a variety of settings such as out/inpatient clinics, hospitals, schools, businesses, consulting, and much more. Occupational Therapy services provide the following services related to the work environment: acute treatment, job analysis, job placement, functional capacity assessment, ergonomics, work retraining, injury education, and consultation (Miller, 1998). Given all these services, many different organizations utilize Occupational Therapy services. For example, a survey of insurance claims adjusters was conducted to determine the overall satisfaction of the Occupational Therapy services regarding work injury prevention and activities of daily living assessment. They found overall general satisfaction with performance (Mason, 2005). Occupational Therapy takes into consideration a holistic approach which includes an occupational medical approach, but a

psychosocial aspect as well. Occupational Therapy's focus on occupational performance including physical, social, cultural, and psychological aspects of effective function in all life roles provides the best approach to working with persons who have or are at risk of acquiring injuries or illnesses that affect their ability to work (Chiariello, 2003).

Occupational Therapy services can provide solid foundational information on the physical demands and postural controls to understand and implement a body mechanics program within the workplace. All of these aspects of Occupational Therapy services are applicable and beneficial for the work environment. However, a job analysis and hazard analysis are two specific components behind development of a body mechanics program in a manual material-handling environment.

The scope of Occupational Therapy practice in industrial therapy services relate directly to the Occupational Therapy frames of reference and these services would benefit a workplace in prevention and rehabilitation (Miller, 1998). Specifically, two frames of references are used in this scholarly project application. First, the biomechanical approach which focuses on human occupational function from a function/dysfunction standpoint. This includes quantifiable measurement of the functional tasks by weight, lifting heights, frequency, dimensions, scope, duration, and psychosocial aspects to best understand human function relating to environmental constraints and requirements. Using the biomechanical approach, Occupational Therapy services understand proper human function and posture related to job tasks by conducting a job analysis and hazard analysis. Second, a community-based frame of reference will be used to in the delivery or education of the information determined with the biomechanical approach. It is the

PRECEDE-PROCEED model which stands for predisposing, reinforcing, enabling, causes in educational diagnosed and evaluation; and policy, regulatory, organizational, constraints, in education and environmental development (Scaffa, 2001). Basically, this model is a health education model intended to be applied across several different areas. This model occurs in several phases and domains which are; social, epidemiological, behavioral, educational, and administrative (Scaffa, 2001). This model uses an approach to education by taking action on each of these domains in order. Specifically, the model helps with laying a foundation for educational strategies used in adult learning with techniques, devices, and methods. It is recommended to be used in an injury prevention program, such as body mechanics with in a manual material handling environment, but it is not intended to be used as a sole frame of reference. For this reason, it is combined with the biomechanical approach and used to educate on the fundamental building blocks of a job analysis for correct work postures.

Job Analysis: A job analysis is a systematic process of analyzing all aspects of a particular job. When Occupational Therapists conduct a job analysis, they are using their skills and training they have with medical diagnosis, human anatomy, anthropometrics, task analysis, kinesiology, education, psychology, and much more. During a job analysis, an occupational therapist observes, participates, video records, and/or measures the job, in motion, to break down each step of the job taking into consideration the physical, mental, and psychological requirements. The Occupational Therapist will examine the following demands including, but not limited to; strength needed, climbing, stooping, reaching, communicating, hearing, seeing, temperature, noise, mental requirements, and

adaptations (SHL Group, 2001).

When companies have a job analysis conducted by Occupational Therapy services, it provides information for developing job descriptions, employee training, employee education, placement, posture analysis, body mechanics, ergonomics and much more. A job analysis can also be extremely beneficial in determining job demands and essential functions under the Americans with Disabilities Act or the Family Medical Leave Act. The job analysis covers physical demands, weight lifted, duration, frequencies, heights, and hazards of the job to the general workforce versus a specific individual. Last, a job site analysis can be provided as a service to address reasonable accommodation, proper body mechanics, procedures, modification and adaptation.

Job Hazard Analysis: A job hazard analysis should also be conducted at the time of the job analysis. A job hazard analysis is a technique that focuses on job tasks to identify hazards before they occur. It focuses on the relationship between the work, the task, tools, and the environment. A hazard analysis seeks controllable measures to alleviate risks determined by the job analysis. For example, a job analysis may determine the demand to lift 100 pound product 10 feet from the floor to a shelf, and a hazard analysis would determine the hazards of lifting improperly during that action. A job hazard analysis related to MSDs would analyze hazards associated with poor postures, muscle imbalance, awkward postures, cold environments, vibration, forceful movement, and repetition. Ideally, after you identify hazards, you will take steps to eliminate or reduce them to an acceptable risk level (OSHA, 2000).

Both of these analyses are conducted by Occupational Therapy Services and are

needed to determine proper body mechanics in a manual material-handling environment. These occupational biomechanical tools are used to gain information to educate on best practices with body mechanics in a material handling environment. In addition, the PRECEDE-PROCEED model is recommended to be used in conjunction with these tools to gain a community model for the teaching strategies and methods of monitoring this education. These frames of references and tools are successfully used from the perspective of an Occupational Therapist to develop a body mechanics program for a manual material handling environment.

An Occupational Therapist would also be concerned about the outcome measurements involved with the program success. The outcomes measurements will follow the basic OSHA and business practices of measurement. They will be measured in two ways. First, the affects of this program from an injury standpoint need to be measured by worker's compensation expense perspective and second from an injury data perspective. The accounting department of the company will be able to provide the program administrator with baseline worker's compensation expense information prior to program implementation and the expenses incurred once the program has been implemented. In addition, an organization's workers' compensation insurance carrier will also be able to give information on indemnity or wages paid out as well as medical costs in almost any form of report. Next, the injury data should also be reviewed from a base line perspective. A complete review of the company's OSHA log and hours worked can help measure the frequency, severity, and disability rates. A comparison from baseline to monthly intervals after the implementation will help to measure success.

Proposed OT Body Mechanics Program

Based on the review of literature, an Occupational Therapy based Body Mechanics Program in a Manual Material-handling Environment was developed. This program is designed to be implemented from the perspective of an Occupational Therapist. The main product will be presented as a body mechanics teaching module for a manual material-handling environment. The PRECEDE-PROCEED health education community model for adult learning was used to design the teaching module for proper training. This adult learning approach helped to establish the devices, techniques, and methods of instruction.

This teaching module provides information on: 1) best practices regarding body mechanic training and education programs, 2) presentation/teaching strategies and methods to increase the opportunity for success and 3) identify effective methods to monitor the success of body mechanics training and education. The teaching unit will train supervisors on proper education of anatomy, hazards, proper spine alignment, positive reinforcement and demonstration of correct work postures. Thus, supervisors will have the knowledge and skills to train their employees on proper body mechanics in a manual material handling environment and monitor for compliance. The topics covered in the teaching module are covered in three units, which are; human anatomy/spine alignment, hazards, and correct work postures.

Through these detailed educational units the learner will be able to; identify improper or unsafe material-handling, understand the mechanisms behind the human body, demonstrate proper body mechanics, teach others on proper body mechanics, and give effective feedback to employees on safe proper body mechanics.

CHAPTER III

METHODS

Based on the review of literature, an Occupational Therapy based Body Mechanics Program in a Manual Material-handling Environment was developed from the perspective of an Occupational Therapist. The program is a body mechanics teaching module based upon: 1) best practices regarding body mechanic training and education programs, 2) presentation/teaching strategies and methods to increase the opportunity for success and 3) identify effective methods to monitor the success of body mechanics training and education.

The teaching unit will train supervisors on proper education of anatomy, hazards, proper spine alignment, positive reinforcement and demonstration of correct work postures. Thus, supervisors will have the knowledge and skills to train their employees on proper body mechanics in a manual material handling environment and monitor for compliance.

The Body Mechanics Teaching module was developed with the idea that manual material handling workers are exposed to several types of hazards that result in MSD work related types of injuries such as back strains. With this idea in mind, the literature review was conducted to establish the presence of this concern in the professional published literature. The literature indicated a vast issue with MSDs in the manual

material-handling workplace and that back injuries in particular were the most costly and frequent in nature. A comprehensive review of injury data in the literature review of material-handling environment was performed and this information confirmed the presence of MSD related injuries in this material handling environment and the need for a body mechanics teaching module performed by an Occupational Therapist.

In addition, a job and hazard analysis was conducted by an Occupational Therapist at a typical worksite to understand the biomechanical theory approach to physical motions, demands, and hazards associated with a typical manual material-handling environment for understanding the potential benefit of Body Mechanics Teaching Unit in this type of environment. This analysis showed a large amount of improper material-handling postures existed that can result in MSDs. This analysis clearly established the need for the Occupational Therapy services regarding education on correct work postures. The literature has also suggested that a comprehensive behavior-based delivery model for body mechanics program can create the most compliance of a safe behavior in a manual material-handling environment.

The final step was to identify an effective method/theory to teach the information. The PRECEDE-PROCEED health education community model for adult learning was used to design the teaching module for proper training. This adult learning approach helped to establish the devices, techniques, and methods of instruction. The topics covered in the teaching module are covered in three units, which are; human anatomy/spine alignment, hazards, and correct work postures. Through these detailed educational units the learner will be able to; identify improper or unsafe material-

handling, understand the mechanisms behind the human body, demonstrate proper body mechanics, teach others on proper body mechanics, and give effective feedback to employees on safe proper body mechanics.

CHAPTER IV PRODUCT

The teaching module was designed for an Occupational Therapist Instructor to use in training with in a manual material handling environment. This teaching module is designed to be delivered on-site as part of a job site training service of Occupational Therapy practice. Organizations that would most benefit from this module are part of a supply chain commerce in which a significant aspect of their business requires manual material handling labor, for example, airlines industry, warehousing, and package delivery.

The teaching module is designed for supervisors, to provide them with the skills to deliver informed constructive feedback on safe or unsafe practices and work postures as they observe workers in their environments. It is important for the supervision learners to fully understand the impact of this module. The module is intended to reduce injuries within a manual material handling environment through education of the supervision workforce. A full explanation of the methodology of this module needs to be completed in the beginning of the first unit. This would include a statement of the problem, assessment, training, and intended results. The module has three training units focusing on providing education on body mechanics in a manual material environment. Together as a module, the training units identify the following information:

1. Unit One-Human Anatomy and Spine Alignment-This unit cover the basics of human anatomy and spine alignment function in order to understand risk factors and correct work postures.
2. Unit two-Hazards-This unit covers the hazards associated with the human anatomy and spine alignment while conducting work in a manual material-handling environment. Supervision must understand the negative impacts of MSDs in their manual material handling environment.
3. Unit three-Correct Work Postures-This unit covers what are correct work postures for a manual material handling environment and how to give employees feedback on these safe or unsafe acts of movement. This is why the unit was designed, so they as a supervision staff could educate their employees on proper methods to avoid injuries and in particular back injuries.
4. Resources

It is best to teach each of these units separately in a classroom setting in order to: 1) not overwhelm the learner with information 2) allow them the time to practice the skills and 3) bring questions/comments back to the class sessions. The last module will require an on-site hands-on education away from the classroom. The whole module should be presented with in three weeks, with a new module each week for optimal learning.

The product is to be marketed as an injury prevention tool where a needs assessment has already been completed for the purpose of conducting this training. The best method for marketing is to directly communicate to targeted industries on the costs of MSD injuries and the potential benefit of reducing these injuries through this program. These services should be properly informed through an Occupational Therapy consulting or service delivery approach for reducing injuries.

**An Occupational Therapy
Teaching Module
For Body Mechanics within a
Manual Material Handling
Environment**

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Introduction

The module was designed for an Occupational Therapist Instructor to use in training within a manual material handling environment. This teaching module is designed to be delivered on-site, as part of a job site training service of Occupational Therapy practice as part of an injury prevention program where a needs assessment has already been completed for the purpose of conducting this training.

This teaching module focuses on manual material handling work environments due to the presence of musculoskeletal disorders caused from labor-intensive job duties. Organizations that would most benefit from this module are part of a supply chain commerce in which a significant aspect of their business requires manual material handling labor, for example, airlines industry, warehousing, and package delivery. The module follows a biomechanical frame of reference, which focuses on mechanical components of human function and occupation. In addition, the PRECEDE-PROCEED health education model for adult learning was used for the organizational design and delivery of this training. The PowerPoint presentations are included on the CD-ROM provided.

The teaching module is designed for supervisors, to provide them with the skills to deliver informed constructive feedback on safe or unsafe practices and work postures as they observe workers in their environments. It is important for the supervision learners to fully understand the impact of this module. The module is intended to reduce injuries within a manual material handling environment through education of the supervision workforce. A full explanation of the methodology of this module needs to be completed

in the beginning of the first unit. This would include a statement of the problem, assessment, training, and intended results. The module has three training units focusing on providing education on body mechanics in a manual material environment. Together as a module, the training units identify the following information:

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It is best to teach each of these units separately in a classroom setting to ensure: 1) not overwhelm the learner with information 2) allow them the time to practice the skills and 3) bring questions/comments back to the class sessions. The last unit will require an on-site hands-on education away from the classroom. The whole module should be presented with in three weeks, with a new module each week for optimal learning.

The training units identify the following information for the presenter:

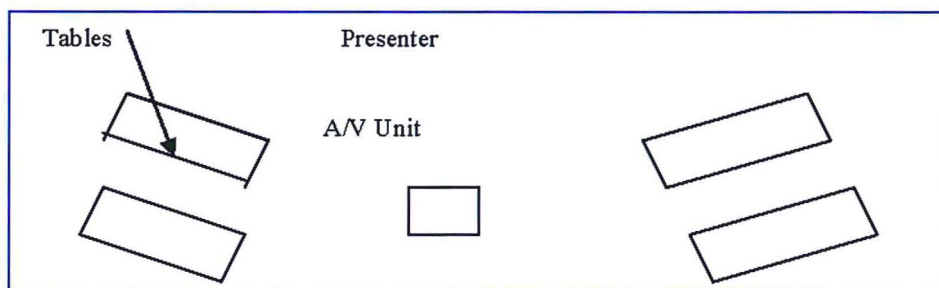
1. Best practices regarding body mechanic training and education programs for a manual material handling environment.
2. Presentation/teaching strategies and methods to increase the opportunity for the learner's success.
3. Effective methods to monitor the success of body mechanics training and education.

The product is to be marketed as an injury prevention tool. The best method for marketing is to directly communicate to targeted industries on the costs of MSD injuries and the potential benefit of reducing these injuries through this program. These services should be properly informed through an Occupational Therapy consulting or service delivery approach for reducing injuries.

Instructional Design and Learning Environment

The Occupational Therapist Instructor will deliver each unit based on the instructional design with the use of devices, methods, and techniques for optimal adult learning. The instructional procedures presented in this manual are based on adult learning theory and teaching approaches adopted from the text titled, “An introduction to helping adults learn and change”, by (Robinson, 1994). The PowerPoint presentations are included on the CD-ROM provided.

Devices used in adult learning include: books to simulators, from film to working models, and from chalkboards to videotapes. These instructional aids extend or increase the effectiveness of methods and techniques, but which cannot be used as the only form of instruction. The different devices and environmental considerations for instructor to follow is each unit. The units will use devices such as whiteboards, projectors, handouts, demonstration props, simulation stations, and classroom design. The teaching environment as a device will be a simulation station and a basic classroom herring bone group design, which is demonstrated here in this illustration.



The methods used in adult learning are the ways in which people are organized in order to conduct an educational activity. Methods are designed in individual methods,

group methods, and community methods, which these units use in order to obtain the goals of the whole module. The method portion of each unit shows the instructor the perspective to teach the information to their learners and brings the course through the requirements to accomplish each unit's objectives. The methods used in this module are individual, group, and community methods. This is accomplished through individual lecture, group interaction, and the work place community interaction.

Techniques used in adult learning are the ways in which the instructional agent establishes relationship between the learner and the learning task. Techniques are designed to help the learner acquire information, acquire skill, apply knowledge, develop creativity, and change an attitude or viewpoint. The module has helpful explanations of how each unit is delivered and what style of teaching the instructor is to follow. The module will use teaching techniques in some or all of the three units, they are: use of questions, group discussions, behavior modeling, demonstration, and simulation teaching methods.

Module Design and Organization

Each of the three units will follow an introduction, objectives, devices, methods, techniques, and review/evaluation format. The specific measurable objectives are intended to guide the instructor and the students to identify and develop the knowledge, skills, and attitudinal aspects of adult learning. Ultimately, the goal of these units is to train supervisors on proactive methods of body mechanics to prevent MSD injuries for

their workforce with in a manual material handling environment.

Each unit is designed in this logical format to achieve the objectives of the module. The information is in a specific order to enhance the ability to understand, retain, and demonstrate the ability to apply the valuable information on body mechanics in a manual material handling environment. This process also includes a review session that allows the instructor to evaluate the success of the training. The first unit on anatomy and spine alignment is the foundation for understanding the next two units on hazards and correct work postures. Based on unit two's understanding of how there can be hazards with human anatomy function and spine alignment, unit three delivers on correct work postures that alleviate those hazards. These hazards are identified in a job hazard analysis in the appendix part b. the correct work postures are derived from a job site analysis, which is also in the appendix part A. In addition, there is a body mechanics observation checklist and program evaluation form in the appendix part D and C.

The training units are as follows with a brief descriptor of each:

Unit I: Proper education of anatomy/spine alignment

The objective of this unit is to educate the supervisor on the anatomy and proper spine alignment involved with tasks with in a manual material handling environment. The supervisor will attain knowledge to be able to simply explain anatomy and spine alignment associated with manual material handling to their workforce. This will include the muscles associated with the human torso and proper spine curvature.

Unit II: Hazards

The second unit's objective is to educate the supervisor on the risk factors and hazards with in a manual material handling environment. The supervisor will be able to demonstrate and explain actions to employees that are hazardous that contribute to MSDs while conducting work with in manual material handling environment.

Unit III: Demonstration of correct work postures

The last Unit's objective is to educate the supervisor on the ability to teach proper work postures and body mechanics to their workforce. The supervisor will be able to demonstrate the skill of training others on how to lift correctly, show proper work motion, and have proper spine alignment while providing appropriate feedback to the employee on their performance.

Outcome Evaluation

The outcome evaluation is measured in two ways. First, the affects of this program from an injury standpoint need to be measured by worker's compensation expense perspective and second from an injury data perspective. The accounting department of the company will be able to provide the program administrator with baseline worker's compensation expense information prior to program implementation and the expenses incurred once the program has been implemented. In addition, an organization's workers' compensation insurance carrier will also be able to give information on

indemnity or wages paid out as well as medical costs in almost any form of report. The financial data should be reported as a percentage of sales at baseline and on a monthly basis. This information should be reported to the director of the business unit.

For example:

2006 Work Comp Month	% Sales		WC		% Sales		Goal
	OSHA's	Total	Expense		Total	Expense	
March	21	0.02%	281,468		0.025%	217,512	
April	34	0.03%	359,584		0.03%	340,221	

This table has the goals of the organization based on sales and the number of OSHA recordables. This table has work comp percentage of sales actual compared to goal. Typically, those running the organization will have financial performance objectives, which will help gain support for this cost saving program.

Second, the injury data should also be reviewed from a base line perspective. A complete review of the company's OSHA log and hours worked can help measure the frequency, severity, and disability rates. A comparison from baseline to monthly intervals after the implementation will help to measure program success. Here is how to conduct OSHA rates.

RATE

Frequency # of injuries X 200,000/ # of labor hours = Frequency or OSHA rate

Example 11 injuries X 200,000 = 22,000,000

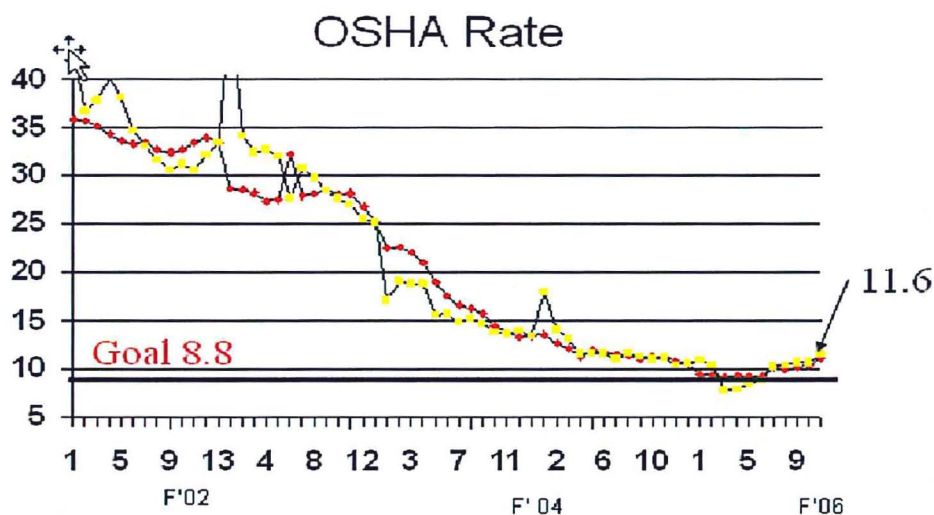
22,000,000/ 250,000 labor hours=**8.8** OSHA rate

Note: 200,000 is a constant in all equations, it is a ratio, 100 employees working 2,000 hours a year. The following are calculated the same manner.

Disability # of lost time injuries X 200,00/ # of labor hours=Disability rate

Severity # of lost time days X 200,000/ # of labor hours=Severity rate

This measurement allows you to analyze any workplace equally by conducting a ratio. It is an accepted practice by OSHA as a way to measure how “safe” your environment is as defined by our industry standard. To find an industry’s common injury rates, look up the SIC code or Standard Industry Code and relay that back to OSHA’s reporting data found at OSHA.gov. This allows an organization to measure the same environment with a lot of hours of exposure or minimal hours of exposure to injuries. Here is a typical way to present this data in a power point graph form.

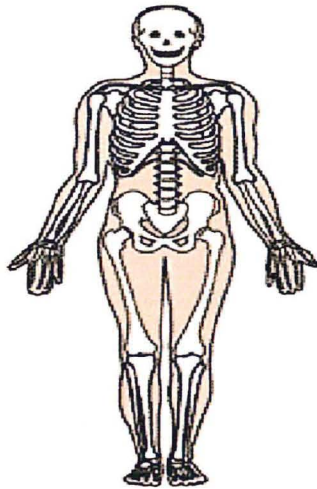


Legend: Rolling YTD

Again, all of this information should be analyzed and reviewed with management staff on a monthly basis. The goals of the organization should be developed based on this information. These goals can be placed in all management staff annual performance measures. For example, Reduced OSHA ,DIFR, Severity rates to 11.0, 2.5, 30 respectively or achieve a .02% of sales expense ratio.

Unit One

Anatomy and Spine Alignment



Unit One

Anatomy & Spine Alignment

Introduction

Unit one's focus is on human anatomy and spine alignment. This unit is based on the belief that, in order for the learner to understand the components of proper work methods in a manual labor environment, one must be able to have a fundamental understanding of human anatomy function and the mechanical structure of the skeletal system. This unit is meant to give the learner the building blocks of biomechanical information for the next two units presented in this teaching module.

Required Time

The unit should take about one hour depending on questions and the amount of participants with in each course. No more than twelve participants are recommended for an optimal learning experience.

Unit One Objectives:

By successfully completing unit one's group quiz, participating in the class room review discussion, and demonstrating knowledge of unit one's goals in future units a participant will be able to understand and apply the following information:

- Understand human anatomy and spine alignment associated with body mechanics
- Understand spinal curvatures and preservation of proper alignment
- Understand basic muscle function of nerve impulses and lever action of the human skeleton

- Understand basic mechanical function associated with the human spine

Devices

Unit one will require the following devices for instruction of Anatomy and Spine alignment:

- A classroom setting with several tables and chairs for a herring bone style set up
- Proper audio visual equipment:
 - a laptop computer with power point software
 - projection screen
 - table and projector
- Dry erase board with markers and eraser
- A laser pointer or pointer with the ability to point to aspects on the screen
- A instructional human skeleton or complete model spine of the human torso
- Print out the power point presentation in hand out format for the participants prior to the course so they will have the ability to take notes.

Methods & Techniques

The information is presented using a lecture-discussion format to provide basic knowledge on human anatomy and spine alignment.

1. Begin the class with a Warm-up Activity. Ask for volunteers to begin the exercise by asking questions. If no one volunteers, call on one specific person and proceed around to the other participants in the room. Write the three following questions on the white board:
 - a. Current job position,

- b. Number of years with the company, and
 - c. Previous job experiences
- 2. Power Point Presentation
 - a. Use the introduction on the power point presentation, slides 1-5
 - b. Review module objectives and agenda for the session
 - c. Explain the purpose of the training modules as described in the introduction of this chapter.
 - d. Cover the power point presentation (see end of unit for instructor notes)
 - e. Always ask if there are any questions on the objectives, purpose of the training or information presented.
- 3. Group Quiz
 - a. The quiz is planned near the end of the lecture and it is located at the end of this unit. The purpose of the quiz is to help retain the information gathered during the unit's lecture.
 - b. Split the whole group up into groups of 2-3 participants and give each group a copy of the Quiz.
 - c. Therapist is to walk around the room looking for group progress and helping out where groups that may need help with the questions.
- 4. Review and Answer
 - a. Reconvene the whole group and review the answers to the quiz by asking the participants the quiz questions.
 - b. The instructor/presenter 'fills-in-the-blanks', as needed if the participants

do not answer the questions.

5. Conclusion

- a. Ask the class for any further questions. This serves as the review and evaluation of monitoring success in obtaining the module objectives and highlights of the module
- b. The instructor relays the time, date, and place of unit two's class instruction.
- c. Inform the participants that a course evaluation will be introduced after the last unit is complete.
- d. Dismiss the class.

Unit I: Power Point Outline

Instructor Notes

Slide 1

Body Mechanics for a Manual Material-
handling Environment
Unit I
Anatomy & Spine Alignment

Jeremy Laine

Slide 2

Agenda

- Introduction to Body Mechanics
- Human Anatomy
- Exposure/Contributing Factors
- Musculoskeletal Disorders
- Body Mechanics
- Ergonomics
- Prevention
- Observations – what & why
- Hands-on Training

Slide 3

UNIT I: OBJECTIVES

- Understand human anatomy and spine alignment associated with body mechanics
- Understand spinal curvatures and preservation of proper alignment
- Understand basic muscle function of nerve impulses and lever action of the human skeleton
- Understand basic mechanical function associated with the human spine

Slide 4

Introduction To Body Mechanics

Slide 5

Body Mechanics

- Body Mechanics - NOUN: *(used with a sing. or pl. verb)* The application of kinesiology to the use of proper body movement in daily activities, to the prevention and correction of problems associated with posture, and to the enhancement of coordination and endurance.

Slide 6

What is body mechanics?

Body mechanics can be described as the proper or most efficient way to perform daily activities that are safe, energy conserving and help prevent the physical strains that may cause injury.

Slide 7

Body Mechanics Training

- The purpose of this training is for supervision to be able to identify safe and unsafe behaviors in relationship to body mechanics through observations.
- Supervisors will have the knowledge and confidence to give positive and constructive feedback on those behaviors.

Body Mechanics Training

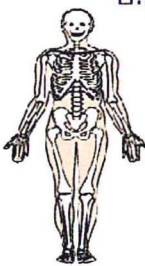
The goal of this training is to address the behavior through observation and feedback.

Slide 8

Human Anatomy

Slide 9

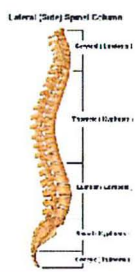
Human Skeleton



- The human skeleton is composed of 206 bones, 33 of which are located in the spine.
- The skeleton is the structural foundation of the human body.
- It is a levered system which allows your muscles to operate your movement.

Slide 10


Spinal Column



Your spine is a complex arrangement of bones, joints, muscles, ligaments, discs, a spinal cord and nerves.

Slide 11

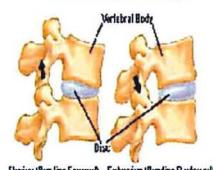
Discs



The discs absorb shock from the changing weight loads applied to the spine from excessive, as well as normal activities such as walking, running, lifting and so on.

Slide 12

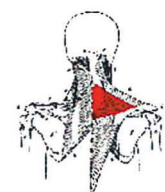
Vertebra & Discs



- Facet joints and discs allow the spine to bend and twist.
- A disc herniation is not repairable through the body's normal healing process.

Slide 13

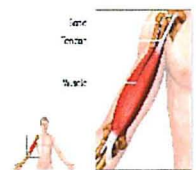
Muscle



- Muscle is made up of individual and segmental strands of tissue.
- When muscles encounter excessive external force, individual strands can stretch or tear while the rest of the muscle is spared injury.

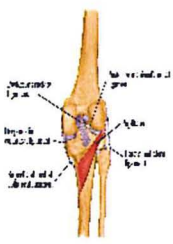
Slide 14

Tendons



- A tendon is a cord that connects muscle to bone.
- Tendons often become inflamed.

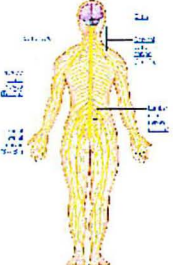
Slide 15



Ligaments

- Ligaments are strong flexible bands of fibrous tissue.
- Ligaments link bones together.
- Although ligaments are resistant to being stretched, they do allow some freedom of movement.

Slide 16



Nerves

- Nerves control the body's functions including the vital organs, sensation, and movement.
- The nervous system receives information and initiates an appropriate response.

Slide 17

QUIZ

- 1. What is meant by lever system?
- 2. What are spinal curves and proper alignment?
- 3. How do muscles work, and what do nerves do in relation to them?
- 4. What is the difference between tendons and ligaments?
- 5. How does this relate to body mechanics, as you know it?

Slide 18

SUMMARY

- Any questions??
- Next session

Thank you

QUIZ

1. **What is meant by lever system?**
2. **What are spinal curves and proper alignment?**
3. **How do muscles work, and what do nerves do in relation to them?**
4. **What is the difference between tendons and ligaments?**
5. **How does this relate to body mechanics, as you know it?**

Unit Two

Hazards



Unit Two

Hazards

Introduction

Unit two's focuses on hazards and their contributing factors to injury. In order for the learner to understand the components of proper work methods, in a manual labor environment, one must be able to have a fundamental understanding of hazards and factors that contribute to dysfunction from a biomechanical perspective. This module is meant to build upon the information learned from unit one in order to prepare learner for understanding the third unit of the module.

Required Time

This unit should take about one hour depending on questions and the amount of participants with in each course. No more than twelve participants are recommended for an optimal learning experience.

Unit Two Objectives

By successfully completing unit two's group quiz, participating in the class room review discussion, and demonstrating knowledge of unit two's goals in future units a participant will be able to understand and apply the following information:

- Understand and explain hazards and contributing factors associated with a manual material handling environment
- Understand hazards and their effect on MSDs
- Be informed on back injury statistics and causes
- Know difference between sprains and strains, and causation

Devices

Unit two will require the following devices for instruction on hazards:

- A classroom setting with several tables and chairs for a herring bone style set up
- Proper audio visual equipment:
 - a laptop computer with power point software
 - projection screen
 - table and projector
- Dry erase board with markers and eraser
- A laser pointer or pointer with the ability to point to aspects on the screen
- Print out the power point presentation in hand out format for the participants prior to the course so they will have the ability to take notes.
- A complete model spine of the human torso and human ankle

Methods & Techniques

The information is presented using a lecture-discussion, group discussion, and demonstration format to provide basic knowledge on hazards.

1. Warm-up Activity: The instructor is to facilitate a review of module one by asking a series of questions based on the objectives of module one. Ask for volunteers to begin the exercise. If no one volunteers, call on one specific person and help them out by asking probing questions.
2. Be sure to cover the basics associated with unit one's objectives. The questions are:
 - The human skeleton is a _____ system?

- Spine alignment preserves the natural _____ of the spine?
- What do nerves do for muscles?
- _____ connects muscle to bone?
- _____ connects bone to bone?
- What does this information have to do with body mechanics?

3. Power Point Presentation

- a. Review unit's objectives and agenda for the session
- b. Explain the purpose of the training module as described in the introduction of this chapter.
- c. Cover the power point presentation (see end of unit for instructor notes)
- d. Always ask if there are any questions on the objectives, purpose of the training or information presented.

4. Review and Group discussion

As a whole group, collaboratively answer the following questions: (write questions on dry erase board)

- What are some hazards in your working environment?
- What types of injuries result from these hazards?
- What causes back injuries in this work place?
- What is the difference between a sprain and strain?
- How does this relate to body mechanics, as you know it?

5. Therapist is to ask probing questions about the environment in which the training occurs.

- a. This is a chance for the therapist to weave in specific aspects of the environment the module is meant to help in reducing injuries.
- b. The therapist will review the questions and provide answers where necessary. This is a chance to review and evaluate the success of the training.
- c. Ask the class for any further questions.

6. Conclusion

- a. The instructor is to discuss accomplishment thus far by completing unit two.
- b. The instructor relays the next unit time, date, and place of unit three's class.
- c. Inform the participants that a course evaluation will be introduced after the last unit is complete.
- d. Dismiss the class.

Instructor Notes

Slide 1

Exposures and
Contributing Factors of
Manual Material
Handling

Slide 2

UNIT I: REVIEW

- The human skeleton is a _____ system?
- Spine alignment preserves the natural _____ of the spine?
- What do nerves do for muscles?
- _____ connects muscle to bone?
- What does this information have to do with body mechanics?

Slide 3

UNIT 2: OBJECTIVES

- Understand and explain hazards and contributing factors associated with a manual material handling environment
- Understand hazards and their effect on Musculoskeletal Disorders (MSD's)
- Be informed on back injury statistics and causes
- Know difference between sprains and strains, and causation

Slide 4

Risk factors that may increase the chance of injury include:

- force expended to perform the task
- direction that the force is applied
- repetition of the motion
- posture
- load characteristics
- grip on the load
- workplace conditions
- lighting and visibility
- environmental conditions

Slide 5

Soft tissue injuries due to improper body mechanics can lead to the following:

- ♦ Muscle guarding
- ♦ Disc strain and bulge
- ♦ Disc herniation
- ♦ Joint stiffness
- ♦ Postural strains and sprains
- ♦ Osteoporosis
- ♦ Acute strains and sprains

Slide 6

Back Injury Statistics

- 75 to 85 percent of all people will experience some form of back pain during their lifetime.
- Back pain is the second most frequently reported reason for visiting a doctor, the fifth most frequent cause of hospitalization and the third most frequent reason for surgery.
- The highest rate of back pain occurs in the 45 to 64 year old age group.
- 33% of all accidents include the spine or back, it is important we use this as our stabilizer not for prime mobilization.

Slide 7

Musculoskeletal Disorders or MSDs

Slide 8

Musculoskeletal Disorders

- MSDs are injuries to muscles, tendons, ligaments, joints, cartilage, nerves, blood vessels and intervertebral discs of the spine. Typically sprains and strains.
- They vary in severity from simple one day occurrences to disabling long term injuries.
- MSDs affect many parts of the body: especially the back, neck, shoulders, arms, elbows, wrists and fingers.

Slide 9

What is a sprain?

- A sprain is a partial or complete tear of a ligament.
- A sprain can be caused by a hyperflexion or extension of a joint.
- The areas most vulnerable to sprains are ankles, knees, and wrists.

Slide 10

What is a strain?

- A strain is an injury to a muscle or tendon.
- Bones are supported by a combination of muscles and tendons, which connect muscles to bones.
- The strain may be a simple stretch in the muscle or tendon, or it may be a partial or complete tear in the muscle-and-tendon combination.

Slide 11

REVIEW

- What are some hazards in your working environment?
- What types of injuries result from these hazards?
- What causes back injuries in this work place?
- What is the difference between a sprain and strain?
- How does this relate to body mechanics, as you know it?

Slide 12

SUMMARY

- Any questions??
- Next session

Thank you

Unit Three

Demonstration of Correct Work Postures



Unit Three

Demonstration of Correct Work Postures

Introduction

Unit three's focus is on body mechanics and the methods to instruct employees on correct work postures. In order for the learner to understand the components of proper work methods in a manual labor environment, an understanding of the previous units has to have been met and the individual can demonstrate proper work methods associated with body mechanics. This module is meant to give the learner the final information based on the groundwork provided in Units 1 & 2.

Required Time

The unit should take about may take one and a half hours depending on questions and the amount of participants with in each course. No more than twelve participants are recommended for an optimal learning experience.

Unit Three Objectives

By successfully completing unit three's group exercise in all components, participating in the classroom review discussion, and demonstrating knowledge of the module's goals.

The participant will be able to understand and apply the following information:

- Understand and explain body mechanics in a manual material-handling environment while relating valid information on human anatomy, spine alignment, and hazards.
- Understand proper body mechanics to avoid soft tissue injuries

- Be informed and identify improper mechanics
- Demonstrate and training on how to lift correctly and have proper work postures
- Appropriately give feedback and explanation on body mechanics for employees to avoid MSD injuries in the future.

Devices

Unit three will require the following devices for demonstration on correct work postures:

- A classroom setting with several tables and chairs for a herring bone style set up
- Proper audio visual equipment:
 - a laptop computer with power point software
 - projection screen
 - table and projector
- Dry erase board with markers and eraser
- A laser pointer or pointer with the ability to point to aspects on the screen
- Print out the power point presentation in hand out format for the participants prior to the course so they will have the ability to take notes.
- A complete model spine of the human torso and human ankle
- Demonstration station for demonstrating proper body mechanics within the classroom, box or milk crate. In addition, it will require stations where the learners are able to demonstrate their skill in proper body mechanics
- Work site simulation stations to recreate a manual material-handling situation in order to review proper work postures and give feedback accordingly.
- Need a copy of the evaluation form for each participant

Methods & Techniques

The information is presented using a lecture-discussion, demonstration, and simulation format to provide basic knowledge on demonstration of correct work postures. The instructor will complete a classroom demonstration of proper body mechanics. In addition, a group simulation is planned near the end of the lecture to help retain the information gathered during the lecture. **This module will require the Therapist Instructor to have pre-set stations for work simulation set up prior to the unit training.**

1. **Warm-up Activity:** The instructor is to facilitate a review of module two by asking a series of questions based on the objectives of module two. Ask for volunteers to begin the exercise. If no one volunteers, call on one specific person and help them out by asking probing questions. The questions are:
 - a. Name several different motions that are hazardous?
 - b. Name some types of soft tissue injuries?
 - c. What does MSD stand for, and what does that mean?
 - d. Are back injuries common, why?
 - e. What is the difference between a sprain and strain?
 - f. What does this information have to do with body mechanics?
2. **Power Point Presentation**
 - a. Review units objectives and agenda for the session
 - b. Explain the purpose of the training module

- c. Cover the power point presentation (see end of unit for instructor notes)
- d. Always ask if there are any questions on the objectives, purpose of the training or information presented.

3. Group Activity

- a. The therapist explains the group's hands-on exercise for work simulation on correct work postures.
- b. See appendix A for an observation card a supervisor can use for delivery and recording the feedback on body mechanics.
- c. Prior to splitting into groups, the therapist should lead a basic warm-up stretching activity. When conducting manual material handling, such as this lifting simulation, it is important to completely stretch the muscles of the body. This will allow for a "warm-up" of the muscles and reduce the risk of a potential strain. Simple stretches such as; toe touches, torso twists, hamstring/quadriceps leg pulls, back extensions, reaching up with your arms, and chest/shoulder pulls is recommended. This portion will take about a half an hour.
- d. Split the class into groups of 3-4 persons. Each person is required to
 - o Complete one simulation exercise,
 - o Complete one exercise on giving feedback, and
 - o Complete one exercise on receiving feedback.

- e. With pre-set simulation stations, the therapist explains how each participant will demonstrate what they have learned through out these units. Specifically:
 - They will lift and place several products from table height to the floor several times each or lift in the simulation environment chosen by the therapist. During which, they will attempt to perform proper body mechanics as described in this unit.
 - In addition, their peers will give them positive and constructive feedback on their ability to perform these proper body mechanics through observations.
- f. When available, the therapist instructor should use real life environments related to the jobs that these learners supervise.
- g. If the therapist feels the group is not comfortable performing this task. The therapist should perform lifts for the participants to give feedback on first. The therapist should make some errors in order to provide an opportunity for constructive feedback.
- h. The therapist instructor should be walking around the room to answer questions and critique the learners on what they are doing.
 - The therapist should answer the questions and redirect the learners if they are not providing the proper feedback.

- Be sure that the feedback is accurate in nature and not just constructive or positive.
- Encourage the learners to explain why they gave a specific type of feedback.
- In addition, the therapist should be looking for potential improper body mechanics that are not addressed by the peers.

4. Review and Summary

- a. Body Mechanics-Bring the group back together. Ask for their feedback.

- How did things go?
- What did you like?
- And were there any barriers?

5. Last and most importantly, give the learners an expectation. Tell them to give proper feedback on body mechanics daily to their employees. This is a good way to talk with employees and help them avoid injuries in the future.

6. Appendix B: Evaluation and Dismissal

- a. Ask the class to complete the evaluation form from appendix B.
- b. Thank them for participating and dismiss the class after they complete the evaluation.

Instructor Notes

Slide 1

Module 3

Body Mechanics &
Observation Instruction

Slide 2

REVIEW

- Name several different motions that are hazardous?
- Name some types of soft tissue injuries?
- What does MSD stand for, and what does that mean?
- Are back injuries common, why?
- What is the difference between a sprain and strain?
- What does this information have to do with body mechanics?

Slide 3

PURPOSE OF TRAINING MODULE

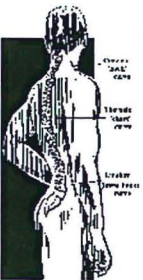
- The teaching module is designed for supervisors, to give them the skills to deliver informed constructive feedback on safe or unsafe practices and work postures as they observe workers in their environments.
- It is important for the supervision learners to fully understand the impact of this module.
- The module is intended to reduce injuries within a manual material handling environment through education of the supervision workforce.

Slide 4

UNIT 3: OBJECTIVES

- Understand and explain body mechanics in a manual material-handling environment while relating valid information on human anatomy, spine alignment, and hazards.
- Understand proper body mechanics to avoid soft tissue injuries
- Be informed and identify improper mechanics Demonstrate and training on how to lift correctly and have proper work postures
- Appropriately give feedback and explanation on body mechanics for employees to avoid MSD injuries in the future.

Slide 5



Why use proper body mechanics?

- To prevent soft tissue injury
- To help preserve the natural curves of your back
- To protect the ligaments and muscles of all elements of your body.
- To decrease the stress and strains that everyday life places on the body

Basic guidelines to remember about body mechanics are:

1. Keep feet apart
 2. Chin up
 3. Bend knees
 4. Keep objects close to your body
 5. Do not twist the body
 6. Exhale – do not hold your breath
 7. Lift with the legs and not with the back
 8. Push, pull or slide instead of lifting
- *Pushing is the best

Slide 6

Body Mechanics Goal

The back muscles are designed for stabilizing the body's center of gravity to allow the muscle groups located in the shoulders, upper arms, hips, and legs to be the prime mobilizers used to lift and move heavy objects.

Slide 7

Posture



- Posture, or body alignment, is the way the body parts are aligned with one another.
- Good body alignment (posture) allows the body to move and function with strength and efficiency.

And by keeping your three natural curves aligned, you distribute the weight of the load evenly throughout your spine, lowering your risk of injury.

Body Mechanics for a Working Back

While your back is a marvelous machine, it is not indestructible, and the price of back injury can be misery. But correct body mechanics-the way you move your body and back-can help prevent back injury.

Whether lifting, bending, pushing, pulling, or twisting, remember, good body mechanics is good back protection.

Slide 8

Body Mechanics with Demonstration

- Position yourself close to product to lift
- Face your hips toward the product to lift
- Roll product towards you
- Break product loose prior to lifting
- Use a hook for high, low or deep reaching product
- Shift your weight with product
- Do not twist while lifting product
- Squat to reach low product
- Lift with your legs
- Stay physically fit/stretch before physical activity

Slide 9

Poor Body Mechanics

- Using one hand
- Lifting multiple heavy products
- Awkward positioning
- Reaching to grasp or place
- Twisting at the torso

Slide 10

Poor Body Mechanics Cont.'d

- With poor body mechanics, lifting even a slight weight can put an excessive strain on your lower back.
- So don't reach and bend from the waist—that forces your back to support your upper body plus the load.
- Poor body mechanics over time can cause disc damage and pain and lead to a herniated disc.

Slide 11

Ergonomics

- The word "ergonomics" comes from the Greek words, "ergos" (work) and "nomos" (laws).
- Thus, the science of ergonomics is the study of how laws of nature effect you and your work environment.
- In an manual environment, this includes how the body interacts with the work area and the equipment used.

Slide 12

Ergonomics Continued

- **Training:** Team lift with heavy weight, reducing overhead lift, use a hook.
- **Work Space:** room to move, working heights, transporting, foot mats, levers, cockpit design
- **Physical Hazards:** lighting, temperature, humidity, flooring and Sanitation, etc.
- **Sensible Handling:** having more product moved by machine i.e. forklifts

Slide 13

Supervisor's Body Mechanics Observations

Slide 14

Body Mechanics Observations

- A process of observation and feedback focusing proper body mechanics
- The feedback process should be both constructive for improper body mechanics and positive reinforcement for proper body mechanics that are safe.

Observation Checklist is in the appendix, part D

Slide 15

Observations

Body Mechanics

- Straighten spine and shoulders squared up to the product being lifted
- Keep abs and thighs tight when lifting; this decreases pressure on other areas other than your low back.
- Do not reach arms to your body; keep product in front of your chest.
- Use retrieval hook for reaching high, low and deep products.
- Brace forearm on leg during low product retrieval.
- Place your foot close to the product, the closer the better.
- Avoid twisting, reaching, and bending often back.
- Lift with your legs, NOT with your back.
- Lift with legs staggered when above shoulder height.
- Move feet and pivot when placing product.
- Avoid one arm product placement; use two arms, especially above shoulder height.
- Place equipment close to work and distance from product, with enough working room without over-reaching.

Observation checklist is in the appendix, part D

Slide 16

Additional Tips on Body Mechanics

- Position yourself close to product; i.e. one foot up or lift foot and put between pallet.
- Roll product towards you, do not lift away from your body.
- Break product loose prior to lifting (glue or shrink wrap). This avoids strain on your muscle and ligaments.
- Shift weight by squatting down like a baseball catcher. This keeps your feet under your body weight and avoids lowback strain.

Slide 17

Giving Constructive and Positive Feedback

- Convey your positive intent
- Describe specifically what you have observed
- State the impact of the behavior or action
- Ask the other person to respond
- Focus the discussion on solutions

Slide 18

Receiving Constructive Feedback

- Focus on the content, not the person
- Listen calmly and attentively
- Clarify the feedback
- Acknowledge the other person's concerns
- Avoid defending or over explaining
- Welcome suggestions

Slide 19

Hands-on Training

Stretching/Warm-up

- Best stretches
- Demonstration, then everyone

Body Mechanics

- Lifting demonstration – therapist
- Lifting demonstration – trainee
- Peer feedback – positive/constructive

Observation checklist form in appendix, part D

Slide 20

REVIEW QUESTIONS

- How did things go?
- What did you like?
- What were the barriers?

Slide 21

Evaluation

- Please complete the evaluation form

Thank you

Resources

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<http://www.osha.gov/SLTC/etools/grocerywarehousing.html>

APPENDICES

Job Analysis-A

JOB TITLE	Grocery Order Selector		
CONTACT/TITLE	Jeremy S. Laine, Risk Control Manager, OTR	PHONE NUMBER	952-238-3433
EMPLOYER/ADDRESS	300 2 nd Avenue South, Hopkins, MN 55343		

GENERAL SUMMARY Operates Powered Industrial Truck (PIT) and selects specific grocery items for placement on pallets. Shrink wraps pallets by hand. Marks pallet with identifying information.

JOB DEMAND	EXTENT	JOB DETAILS	MEDICAL SUITABILITY FOR JOB (TO BE COMPLETED BY PHYSICIAN)		
Physical Activities	% Of Shift	Continuous – C Occasional – O Frequent – F Seldom – S	Yes	No	If No Explain Restrictions
Sitting	5	Seldom			
Standing	85	Frequent – Continuous			
Walking	85	Frequent – Continuous			
Climbing	70	Frequent			
Bending	75	Frequent			
Twisting	75	Frequent			
Pushing/Pulling	50	Frequent			
Crawling	5	Seldom			
Kneeling	5	Seldom			
Crouching/Stooping/Squatting	50	Frequent			
Reach Above Shoulder	40	Frequent			
Reach At Shoulder	40	Frequent			
Reach Below Shoulder	40	Frequent			
Lift/Carry/Lower Lbs 1-15	70	Frequent			
Lbs 15-30	70	Frequent			
Lbs 30-50	50	Frequent			
Lbs 50-75	50	Occasional			
Lbs 75-100	15	Occasional			
Repetition – Hand/Wrist Simple Grasping (one or both)	70	Frequent – both			
Firm Grasping	60	Frequent			
Equipment Operated	80	Frequent – Pallet Jack			
Physical Exposure					
Temperature	100	55° - 90°			
Hazards		Powered Industrial Truck (PIT)			
Other					

SPECIFIC PHYSICAL ACTIVITIES

LIFTING	-	Lifts 50-70 lbs – Occasional
	-	Lifts boxes below 50 lbs. – Frequent
	-	
CARRYING	-	Carries 50-70 lbs – Occasional
	-	Carries boxes below 50 lbs. – Frequent
REACHING	-	Reaches above shoulder to boxes on top shelf of rack – Frequent
	-	Reaches at shoulder level inside rack – Frequent
	-	Reaches below shoulder level to reaching inside – Frequent
	-	Reaches above shoulder to shrink wrap top box on pallet – Occasional
BENDING/TWISTING	-	Bends/twists to retrieve boxes from rack shelves and place on pallets – Frequent
PUSHING/PULLING	-	Pulls boxes from rack shelves – Frequent
	-	Pulls 75 lb. empty pallet from rack – Occasional
CLIMBING	-	Steps up from floor to Pallet Jack – Frequent
SOCIAL	-	Client is of middle to lower class socio-economic scale
	-	Union environment is somewhat reactionary and adversarial
	-	Management is inconsistent with application of policies
	-	Union solidarity is evident
CULUTURAL	-	Culture is somewhat a emotional and paranoid, due to the perception of management breaking promises
	-	Management has been very traditional and poor with collaboration and Communication
	-	A strong work ethic has been instilled in this workforce
ETHNIC	-	There is a very diverse background, with differing ideals and opinions
	-	Management equally represents these populations
PERSON	-	Goals of earning a good living
	-	Continued work, remain productive, and perceive as a good worker
	-	Other comments

ENVIROMENT -	Freezer, Perishables, and Dry grocery warehouses that vary in temperature and conditions.
-	Typical racking layout with minimal hazards
-	Hazards include ergonomic design and repetition
-	Other-specific analysis of individual environment
-	Other
PERFORMANCE	All employees are expected to be at work, in good physical condition, and attain production standards through safe preferred methods
-	Other
INTERDISCIPLINARY CONSIDERATIONS	
Comments	
SIGNATURE	DATE

Job Hazard Analysis-B

1. Select LT	1. Fall while walking between LT's 2. Struck by machine	1.1: Train on fall prevention 2.1: Train on traffic patterns & awareness in warehouse
2. Perform inspection of LT	1. Struck by machine	1.1: Train on traffic patterns & awareness in warehouse
3. Drive to order box	1. Strike another object/person 2. Struck by machine	1.1: Train on proper use of equipment 1.2: Train on traffic patterns& awareness in warehouse 2.1: Train on traffic patterns& awareness in warehouse
4. Obtain order from box	1. Struck by machine	1.1: Train on traffic patterns & awareness in warehouse
5. Examine order for order filling plan		
6. Select proper number of pallets from stack	1. Inflicting back injury 2. Strike others with pallet	1.1: Train on proper lifting techniques 2.1: Train on safe pallet handling techniques
7. Travel to 1 st slot	1. Strike another object/person 2. Struck by machine	1.1: Train on proper use of equipment 1.2: Train on traffic patterns& awareness in warehouse 2.1: Train on traffic patterns& awareness in warehouse
8. Step off machine & walk to slot	1. Fall while dismounting LT 2. Struck by machine	1.1: Train on fall prevention 2.1: Train on traffic patterns & awareness in warehouse

9. Place label on case & place on pallet	1. Inflicting back injury 2. Struck by falling cases	1.1: Train on proper lifting techniques 2.1: Train on safe picking techniques
10. Pull empty pallet	1. Inflicting back injury 2. Struck by pallet 3. Struck by 2 nd pallet in roller rack	1.1: Train on proper lifting techniques 2.1: Train on safe picking techniques 3.1: Train on safe picking techniques
11. Call in Let Down	1. Struck by machine	1.1: Train on traffic patterns& awareness in warehouse
12. Travel through pick line	1. Strike another object/person 2. Struck by machine	1.1: Train on proper use of equipment 1.2: Train on traffic patterns& awareness in warehouse 2.1: Train on traffic patterns & awareness in warehouse
13. Build pallet(s) to 70 cube each	1. Inflicting back injury 2. Struck by falling cases	1.1: Train on proper lifting techniques 2.1: Train on safe picking techniques
14. Wrap pallet(s) 5x each & mark w/ store #	1. Struck by falling cases 2. Struck by machine	1.1: Train on proper lifting techniques 2.1: Train on traffic patterns & awareness in warehouse
15. Travel to appropriate dock door & park pallet(s)	1. Strike another object/person 2. Struck by machine	1.1: Train on proper use of equipment 1.2: Train on traffic patterns& awareness in warehouse 2.1: Train on traffic patterns& awareness in warehouse

16. Drive back to order box	1. Strike another object/person 2. Struck by machine	1.1: Train on proper use of equipment 1.2: Train on traffic patterns& awareness in warehouse 2.1: Train on traffic patterns& awareness in warehouse
17. Turn in order & pick up new one	1. Struck by machine	1.1: Train on traffic patterns & awareness in warehouse
18. Battery change when needed	1. Dropping battery	1.1: Train on safe battery change procedures

Program Evaluation-C

Thank you for your participation in the Supervisory Body Mechanics Training. Your appraisal, comments and suggestions would be greatly appreciated.

Please indicate your agreement with the following statements:

PROGRAM CONTENT	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1. The session was an effective knowledge-sharing experience.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The session content was concise and well-organized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. The content kept my interest.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The session provided information I would not normally receive.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The information covered was useful and relevant to my job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. The session was worthwhile.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I recommend we continue to hold these future supervisor sessions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Program Evaluation (cont.)

FORMAT	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
8. I thought the overall session format was effective.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I think we should have a follow up session.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. The meeting planners maintained pace and used time effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. The time allotted for each presentation was sufficient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. The PowerPoint was effective.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. The handouts were effective.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. There were enough break times.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. There was enough time for me to ask questions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. The format of the meeting made it easy to ask questions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. In your opinion, was the amount of information shared: *(Circle one)*

Too Little Just Right Too Much
Please explain.

18. What value did the session provide to you?

19. How will you use the information you learned?

20. What would you change about the session?

21. Any other feedback, comments or additional questions about the Supervisory Body Mechanics Training or about anything covered during the session?

Please return surveys to _____
Thank you for your comments.

Observation Checklist on Body Mechanics-D

When retrieving materials:

- Straighten spine and shoulders squared up to the product.
- Keep abs and thighs tight when lifting; this distributes pressure to other areas other than your low back.
- Do not reach across your body, keep product in front of your chest.
- Use retrieval hooks for high, low and deep products.
- Brace forearm on legs during low product retrieval.
- Place yourself close to the product, should not be farther than three inches away, the closer the better.
- Lift with legs staggered when above shoulder height.

When placing materials:

- Avoid twisting, reaching, and bending at low back.
- Lift with your legs, NOT with your back.
- Move feet and pivot when placing product.
- Avoid one arm product placement, use two arms, especially above shoulder height.
This keeps a good muscle balance.
- Place LT in proper slot side and distance from product, with enough working room without over-reaching.

TIPS on Body Mechanics

- Use long hooks to reduce shoulder strain.
- Position yourself close to product.

- Roll product towards you, do not lift away from your body.
- Break product loose prior to lifting (glue or shrink wrap). This avoids strain on your muscle and ligaments.
- Shift weight by squatting down like a baseball catcher. This keeps your feet under your body weight and avoids low back strain.

CHAPTER IV

SUMMARY

The purpose of this project is to provide an OT with a body mechanics program for a manual material-handling environment via a teaching module. An initial assessment of the musculoskeletal disorders, specifically back injuries, was identified in the literature review. This included the cost and extent of the injuries occurring within a manual material-handling environment. The proper method of body mechanics to address this issue was researched and additionally, it was found that an Occupational Therapist is the proper professional to create this program. A complete job and hazard analysis was conducted to determine what body mechanics methods were appropriate for training and education. Last, a biomechanical and PRECEDE-PROCEED community health model approach to the information was applied to the teaching module. This was done so it could be taught to front line supervision to train their employees on proper body mechanics and ultimately reduce injuries associated with MSDs.

Limitations of the Project

This project plan was designed off of a typical manual material-handling environment. This project only serves as a general guide to implementing a program for a manual material-handling environment. The body mechanics teaching module focuses

on effective principles that could be applied to all manual types of jobs. For specific procedural development or safe job procedures an organization should conduct their own job and hazard analysis by an Occupational Therapist. In addition, all safety programs created and implemented are only as successful as the commitment that management makes to them. If a company is trying to implement a body mechanics minded culture, the program director must educate and follow the suggested implementation guidelines. Getting all levels of management involved for support with this program is the key to its success.

Proposal for Project Implementation

Under the oversight of an Occupational Therapist, the project plan should be implemented with a top down management support perspective. The management team should form a committee of equal representatives from all aspects of the operation. This committee will be educated by the Occupational Therapist, help with implementation, and be the main communicator for the program. Management and supervision will be educated by the Occupational Therapist to be trained as body mechanic observers for their environment to ensure employee training, improper mechanics are addressed, and positive recognition for good body mechanics is delivered. Employees will be communicated to on the purpose, goals, responsibilities, and results of the program before, during, and after implementation. The program will be monitored and evaluated by the management, employees, and the committee. As an Occupational Therapist facilitating the program, these are recommended steps to implement a Body Mechanics Program in a Manual Material Handling Environment.

Conclusions

In conclusion, the purpose of this project is to help manual material-handling work environments resolve musculoskeletal disorders within their workplace through a body mechanics educational program facilitated by an Occupational Therapist. There are several reasons for addressing this issue in these types of work environments, they include: higher employee moral, lower injury rates, expense reductions, higher productivity, and much more. Given the demands of manual material-handling jobs, they can be perceived as one of the most unsafe jobs today. A program focus on body mechanics is a cost effective means to addressing these high demands and the potential hazardous results of conducting these jobs. The body mechanics teaching module gives a supervisor with in this type of workplace the tools to educate and instruct their employees on how to be successful. In addition, it provides a delivery model that has been proven more successful than classical types of training. This project plan intends to reduce injuries and worker compensation costs associated with MSDs in the work place, while increase employee moral.

Recommendations for Future Action and Development

The recommendation for this project plan can be summed up in the following subject areas; management support, site assessment, implementation, and proper professionals. First, management support is the first issue that one must address with implementation of any program. Proper education on financial impacts to the organization is a must when conveying the need for this program. Top management's goals are usually financially based, so it must be conveyed by financial gains associated

with this program. Additionally, this is a low cost program that does not require capital investments. Second, site assessment through a job and hazard analysis of your unique environment is strongly encouraged. The information gained from these assessments will allow for the detailed hazards and correct postures for each environment. Only an Occupational Therapist has the proper training to accomplish this goal, especially when it pertains to the medical, job/hazard analysis, psychosocial, and educational aspects of this teaching module. Third, implementation success depends on employee involvement. Following the suggested implementation guidelines is highly recommended for program compliance. The creation of the committee accomplishes many intrinsic values in addition to what has been covered thus far. If employees are not communicated to and not involved in the program it will not be a success.

Last, there are many different types of professionals that could be involved with this type of initiative, but only an Occupational Therapist has a holistic and task analysis approach which no other profession has. The psychosocial and physical approach allows an employer to consider all factors of injury prevention to be successful. An Occupational Therapist has a deep medical understanding combined with the ability to understand the “occupational” work environment in order to deliver a true preventive program like Body Mechanics in a Manual Material Handling Environment. An Occupational Therapist is the right professional to facilitate this program.

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